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ABSTRACT

This look at competency-based education (CBE) begins by defining competency-based training. The five essential elements are discussed--competencies, criterion-referenced evaluation, provision for individual development and evaluation, requirement of student performance, and student-paced instruction. Facilitating or supporting characteristics are listed; these are grouped into instructional and administrative characteristics. Benefits of CBE are highlighted. Focus then shifts to identification of training program needs. A suggested comprehensive vocational education program planning model is presented. Three steps are discussed in some detail: assessing individual needs and interests (including student vocational and educational interests, student needs, student abilities, and adult training and retraining needs), assessing labor market needs, and analyzing and synthesizing existing programs and services. A discussion of development of competency-based instructional materials is followed by information on occupational skill competency-testing, available test products and services, and test selection. Attachments include a CBE student-evaluation model, more specific information on program planning, a reference guide to writing student learning guides, and a CBE program evaluation checklist. (YLB)

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COMPETENCY-BASED EDUCATION AND TRAINING: A Humanistic and Realistic Approach to Technical and Vocational Instruction

Background Paper

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COMPENTENCY-BASED EDUCATION AND TRAINING:
A Humanistic and Realistic Approach to
Technical and Vocational Instruction

Introduction

When teachers and administrators are asked to consider changing their instructional programs from the conventional lecture-discussion approach to the competency-based education (CBE) approach, they logically and quickly ask, why is it really better? Many persons have already concluded that it is indeed better because they feel that it permits more students to reach a higher level of attainment and that it is especially suitable for special/exceptional students who have not experienced success in regular programs.

Before going further, let's look at what some of the authorities are saying about CBE. The National Academy of Sciences, in a report released in 1983, stated--

> Unions, educators, and employers should work to change the requirements for the completion of cooperative education and apprenticeship programs; they should be based on competence rather than time. This change will be fraught with difficulties and will require the expenditure of considerable money and time, but we believe it is extremely important. . . . The difficulties in deciding what competencies should be included, deciding what levels of skill are required, and determining how to measure these abilities are not to be underestimated.[1]

Gary Warner, speaking on behalf of the Associated General Contracters (AGC) of America before a subcommittee of the U.S. House of Representatives, stated--

> AGC believes that construction craft training programs must follow a competency-based approach with each individual progressing at a rate commensurate with a demonstated ability to perform, as opposed to a specified length of time.
>
> Aside from establishing a more efficient vehicle for construction training in general, competency-based instruction provides a better means to facilitate the entry of females and minorities into the industry. With certified skills attained over minimal periods of time, females and minorities can represent to the construction contractor an available manpower resource which can be based on skills and not arbitrary quota requirements established by the federal government. Having been evaluated against performance standards, such a manpower pool represents trained craft workers capable of functioning on a job site and seeing a

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1. Susan W. Sherman, ed. Education for Tomorrow's Jobs. Washington, DC: The National Academy of Sciences, National Academy Press, 1983.

project to completion. Competency-based training also permits the varying rates of advancement necessary to maintain the enthusiasm of the lower-than-average and the faster-than-average trainee.[2]

Dr. Daniel Lyons, Director of Training for the Goodyear Tire and Rubber Company, speaking before the same U.S. House of Representatives subcommittee, stated--

> We believe that the critical, central issue in apprenticeship training is that the wasteful, medieval concept of time-based training must be discarded in favor of competency-based training. . . . The student proceeds through the training on the basis of demonstrated competency rather than on the basis of elapsed time. The superiority, validity, and practicality of competency-based training has been thoroughly and repeatedly demonstrated and documented in technical training throughout industry and the military services.
>
> The Goodyear Tire & Rubber Company is totally committed to competency-based training. Several years ago we decided that we would no longer participate in time-based apprenticeship programs.
>
> It is obvious that time-based traditional programs, which extend training time far beyond that which is necessary to acquire required skills and knowledge, are inefficient and wasteful of financial resources and human talent. U.S. business and industry, engaged in increasingly severe and sophisticated global competition, cannot tolerate this waste. What may not be so obvious is that competency-based training programs consistently produce graduates who are better qualified than those from traditional time-based programs.[3]

Given these comments, which should stimulate any educator's interest in looking at CBE more closely, let's look at what makes CBE so different. To understand what CBE really involves, we will look closely at the following four major subtopics:

- Defining Competency-Based Training
- Identifying Training Program Needs
- Developing the Curriculum
- Developing Competency-Based Instructional Materials

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2. Gary Warner. A statement made on behalf of the Associated General Contractors of America before the Subcommittee on Employment Opportunities of the Committee on Education and Labor, United States House of Representatives, November 17, 1983.

3. J. Daniel Lyons. A statement made on behalf of the Goodyear Tire and Rubber Company before the Subcommittee on Employment Opportunities of the Committee on Education and Labor, United States House of Representatives, November 17, 1983.

Before proceeding, it should be noted that terms and acronyms for these programs abound: CBE, CBI, PBE, PBI, CBVE, CBVI. What is important is that all such programs, regardless of the specific names attached to them, should possess the essential and desirable characteristics described below in order to be considered truly competency- or performance-based.

Defining Competency-Based Training

To comprehend fully the meaning of CBE, one must be aware of the essential elements and desirable characteristics of such programs. There are five essential elements:

1. Competencies to be achieved are carefully identified, verified, and made public in advance--This simply means that the important entry-level competencies for any occupational program area must be identified in some appropriate manner, verified as relevant by experts who know that field, and then made known to students and everyone else interested in what the program is designed to teach.

2. Criteria to be used in assessing achievement and the conditions under which achievement will be assessed are explicitly stated and made public in advance--This means we are going to eliminate guessing games about what parts of the course are important and tell students exactly how their performance will be evaluated. The implementation of this essential element also means that we are giving up the traditional norm-referenced approach to the evaluation of student achievement in which the focus is on comparing a student's progress with that of other students. In its place, we are adopting the criterion-referenced approach in which each individual student's progress is compared with previously established criteria that are made known to all who are concerned.

3. The instructional program provides for the individual development and evaluation of each of the competencies specified--What we are saying here is simply that each student shall be given the opportunity to develop each of the competencies important to his/her training program, and that each student will be given the opportunity to demonstrate attainment of each competency. This essential element has strong implications regarding the need to individualize CBE programs to the maximum extent possible and for the type of instructional materials needed to make individualization possible.

4. Assessment of competency takes the students' knowledge and attitudes into account but requires actual performance of the competency as the primary source of evidence--CBE goes beyond the traditional educational expectation that students should know the "how" and "why" of things and places a strong emphasis on the "ability to do" as well. Of course, in order to perform a task correctly, the student will need to acquire the necessary prerequisite knowledge and attitudes.

Acquiring the necessary prerequisite knowledge and attitudes involved, however, does not by itself ensure the student's actual ability to perform important competencies.

It is with regard to this essential element of CBE that many programs fall short, relying instead only upon paper-and-pencil tests of cognitive understanding as proof of competency. While such measures can appropriately be used to assess prerequisite knowledge, they must be supplemented by performance-oriented, process-and-product checklists or other measurement devices that permit assessment of the student's actual ability to perform the expected competencies.

5. Students progress through the instructional program at their own rate by demonstrating the attainment of specified competencies--Said in another way, we want to make time the variable and learning the constant. Again, it is clear that some individualization of instruction is called for. While student progress is dependent upon the demonstration of competencies, this element does not mean that reasonable time limits cannot be imposed upon the students. Some persons may want to interpret this element to mean that only the student is accountable for his/her progress. Not so--a CBE program places accountability for learning squarely upon the shoulders of both the learner and the instructor.

In addition to the five essential elements of CBE programs, there are a number of facilitating or supporting characteristics. These can be grouped into instructional characteristics and administrative characteristics. These facilitating characteristics help bring the potential of CBE into full reality. They allow students to learn efficiently and instructors to teach effectively. They make vocational education more rational and relevant than ever. A vocational-technical program is considered to be fully competency-based when it exhibits most of the characteristics listed in the following two facilitating categories.

Facilitating Instructional Characteristics

The instruction is designed to include the following instructional elements:

- The instructional materials used (e.g., learning guides or modules) are keyed to the competencies to be achieved.
- Environments that duplicate or simulate the work place are available to students during competency development.
- Basic knowledge or background theory is learned as it is needed to support competency development.
- Students are informed about the traits and attitudes important to workers in the occupation and are periodically evaluated regarding their attainment.

- Each student is given continual and detailed feedback on competency development.
- A variety of learning styles and teaching strategies are provided for.
- Students with appropriate prerequisite skills and knowledge may bypass instruction on competencies already attained.

Facilitating Administrative Characteristics

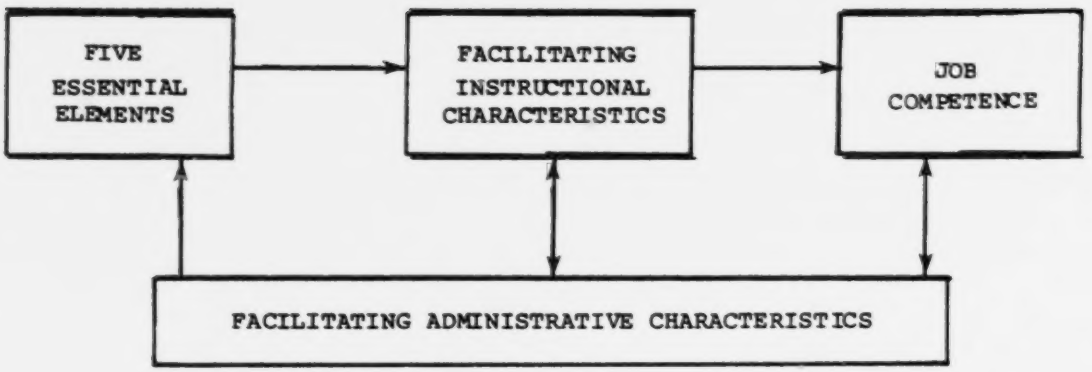
The program is organized and supported administratively to include the following elements:

- Program completion is based on satisfactory achievement of all specified competencies.
- Students can enter and exit from the program at different times.
- Individual student records are maintained and reflect student progress at any given point in time.
- Materials, space, and equipment are available when needed by students and instructors.
- The record-keeping system permits student transfer into and out of the program without requiring duplication of instruction on competencies already achieved.
- The requirement of a designated number of hours of instruction is removed from the criteria for program completion.
- Records of competency attainment are provided to students and prospective employers.
- Student grades, if used, reflect the level of competency achievement attained.
- Credit, if awarded, is given for competencies achieved as a result of instruction and for demonstration of previously acquired competencies.
- Student fees are individually assessed and are based on the time actually spent in the program and the instructional resources used.

When we add the facilitating characteristics of CBE to the five esential elements, the graphic presentation looks like the one shown on the following page.

Thus, the facilitating characteristics support and enhance the potential inherent in the whole CBE process. While the five essential elements must be established with all due rigor and without compromise, it is in the facilitating characteristics that program individuality and adaptability come in. The logic of the facilitating characteristics is so clear that most vocational administrators and instructors can accept them in principle without difficulty.

ESSENTIAL ELEMENTS AND FACILITATING
CHARACTERISTICS OF CBE



For a graphic illustration of what CBE means to the student functioning in such a program, see Attachment A. Another model illustrating how a student may enter, exit, and re-enter a CBE program is illustrated by Attachment B. When implementing CBE, considerations must be given to modifying the traditional instructional and administrative processes so as to facilitate the movement of students through this type of learning and evaluation sequence.

Advantages of CBE

The underlying concepts of CBE are considered by many to be extensions and elaborations of the mastery learning concept proposed by John Carroll[4] in the 1960s and Benjamin Bloom[5] in the early 1970s. Their thinking is substantiated by research results that show that, given favorable learning conditions, most people can learn almost anything. If this seems farfetched, consider the automobile. Here is a fearsome, powerful, and complex machine. Yet practically every adult American has learned to drive it at high speed on the highway, though some of them may not have learned how to read or write or do simple arithmetic. The difference is that in learning to drive they had motivation and favorable learning conditions.

When you accept that most people can learn, then it is difficult to be satisfied with the "normal curve" of instruction in which a certain percentage of students are expected to fail or do poorly. Instead, you teach for success

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4. John B. Carroll, "A Model of School Learning," Teachers College Record, 64 (1963): 723-733.

5. Benjamin S. Bloom, Human Characteristics and School Learning (New York, NY: McGraw-Hill, 1976).

and expect every student to achieve each required skill before moving on to the next one. To be sure that competency is achieved, you change the learning conditions if necessary; you do not eliminate skills or try to change the students.

The traditional view of learning is that there are good learners and poor learners. In this view, the individual's ability to learn is considered to be a rather permanent trait, and a student's position on the normal curve is expected to remain fairly constant throughout school. Based on this traditional view, the important task of a school or college would be to teach those that can learn and weed out those that can't.

A more recent idea is that there are faster learners and slower learners. Much educational effort has been expended to provide slower learners with the extra time and special help they need in order to achieve. Individualization of instruction and extended laboratory time are examples of the ways instructors have sought to meet the needs of slower and more rapid learners. It has become evident that slower learners can ultimately meet the same criteria as faster learners, and they seem to be able to learn equally complex and abstract ideas--if given the necessary time to do so.

Bloom's recent research has led us to the view that, given favorable learning conditions, 95 percent of people can learn almost anything. In addition, the mastery learning principle contends that most students become very similar with regard to learning ability when provided with favorable learning conditions. The term favorable learning conditions is, of course, the crucial element. This may include extra time, additional instruction, a variety of instructional media, or field-based learning experiences, among other things.

This means that educational institutions should provide for a variety of student learning styles and rates, that students should demonstrate competence in one skill before moving on to another, and that instructors must be able to deal with students as individual learners rather than as members of a large group. It also implies that subject-matter content must be carefully identified and organized. In short, it leads to competency-based education. A brief summary of how CBE can benefit the major participants and the community--student, teacher, administrator, and business, industry, labor--is shown on the next page.

There are also significant benefits associated with CBE in the area of educational administration and management. These benefits are virtually automatic when you install this approach. Among the most important are the following:

- Students with a wide range of entering skills can be accommodated.
- Facilities and work stations can be used more fully.
- Program completers can be placed in jobs more readily because they enter the job market all through the year.

CBE BENEFITS

Student

- The learner will achieve competencies required for employment.
- Learners progress at their best pace to achieve occupational skills.
- A wide range of abilities can be accommodated within a program.
- The learner builds confidence by succeeding in learning.
- The presentation of content is more consistent.
- More learning options are available to all students.
- The learner is presented with a transcript of the competencies achieved.

Teacher/Instructor

- Time is used more efficiently and effectively as a leader or manager of the learning process rather than a "provider of information."
- More time is spent working with students individually and in small groups.
- Less time is required to prepare and make lectures.
- Less time is required to develop and grade paper-and-pencil tests.
- More time is spent evaluating students ability to perform essential occupational skills.

Administrator

- Instructional staff can be used more efficiently.
- Building and instructional equipment can be used more efficiently.
- Placement of graduates in jobs is assisted.
- Students with a wide range of entry-level skills, including handicapped, can be accepted.
- Articulating secondary, postsecondary, and part-time adult instructional programs is easier.
- Satisfaction of seeing students achieve their goals.
- Greater support of training programs by business, labor, and industry.

Business, Labor, and Industry

- Optimum involvement in the identification of competencies to be learned by the student.
- More substantive involvement of industry experts in establishing performance criteria and other industrial expectations.
- Availability of potential employees trained in the skills required on the job.
- Better collaborative and more trusting relationships with the schools/colleges.

- The business community is substantively involved in the institution's programs because they are participants in the competency identification process.
- New programs can be readily set up; existing programs can be easily revised and kept current.
- The instructional staff can be used more effectively because they have more time to work with individuals and small groups of students.
- Capital outlay funds can be used more efficiently because it is not necessary to have so many duplicate tools and equipment.
- Students with special/exceptional needs can be accommodated into regular vocational programs by selecting competencies according to their specific needs and abilities.
- Part-time instructors can be used efficiently when the CBE program and materials are in place.
- Program continuity can be maintained even as staff members change.

Related to the management benefits of CBE are the educational benefits to students. Among the most important educational benefits are the following:

- Each learner can progress through the program at his/her best rate.
- Each student can learn using his/her preferred learning style.
- More learners achieve competence than in comparable conventional training programs.
- Learners with little previous educational success build self-confidence and self-reliance by succeeding in a CBE program.
- Students learn to cooperate rather than compete for grades.

Implementation Requires Training and Resources

That CBE will probably cost more to establish and operate is probably best described as an honest misconception. There is no doubt that it will cost money to establish a CBE program. Several types of start-up costs are involved, including the need to provide for (1) the time of faculty and administrators involved in the program planning and development process; (2) the inservice education of all staff about all aspects of CBE curriculum, instruction, and program management; and (3) the purchase or development of instructional media and printed materials. It is highly questionable, however, that these initial development costs are any more than they would be to begin any other type of new program.

As regards operational costs, there are likely to be some increased expenditures. More support staff may be needed to manage the large variety of printed and audiovisual materials used. If learning guides or other printed materials are produced in-house, this will result in the use of more paper supplies. Increased use of consumable materials in shops and laboratories

is also likely because of the repeated practice required for all students to achieve competence.

However, there will also be some savings on operational costs. Probably the major savings will result from the thousands of dollars that can be saved on major equipment. In a lockstep, conventional welding class, for example, most if not all the students would need to have access to arc welders at the same time--hence the need for 10 to 15 welders, which would be used used only part of the year. With CBE, three welders may be enough, because class members will be learning those skills at different times as they learn at different rates or take different "paths" through the program.

One element that characterizes institutions that have successfully implemented CBE, however, is consistency. Regardless of how you decide to approach instructional delivery, it is highly recommended that the approach be common to all programs. While flexibility and creativity are still possible, some uniformity facilitates student and instructor adjustment to CBE.

Staff Orientation

When the elements of your instructional delivery system have been determined, you must initiate the crucial step of staff orientation. Inservice training on each aspect of your CBE approach will be necessary. Small-group instruction or one-on-one assistance seem to be the most effective training strategies to use. If resources permit, establishing a CBE staff resource center that houses materials on CBE development and implementation is an excellent idea. Visits to CBE programs, attendance at CBE conferences, and enrollment in courses on CBE are other viable staff development options. As you develop your long-range CBE plans, do not neglect to allocate funds and resources for staff development. No matter how effective your plan looks on paper, it will be you and your staff--working together--who will make CBE succeed.

Identifying Training Program Needs

It is often said that if you don't know where you want to go, any route will get you there, even though you probably won't know when you have arrived. Take the case of the airline pilot who announced to his passengers over the public-address system, "I've got some good news and some bad news. First the bad news: We're lost! Now for the good news: We're making very good time!"

Needless to say, successful airline pilots and ship captains use maps and various tools to plan their routes so as to ensure that they will arrive at their predetermined destination quickly, safely, and as economically as possible. In a like manner, vocational-technical administrators at all levels must understand and effectively use the tools and techniques of educational program planning. Without effective planning, the predetermined United States legislative goal of "strengthening and expanding the economic base of the

Nation, developing human resources, reducing structural unemployment, increasing productivity, and strengthening the Nation's defense capabilities by assisting the states to expand, improve, and update high-quality programs of vocational-technical education"[6] is not likely to be achieved.

One state director of vocational education describes the role of the local administrator in planning this way:

> Perhaps the most important work that an administrator does is to plan for the future. If planning is well done, then the execution of the program can be accomplished with a minimum of problems. Probably what is more important is that the program will meet the needs that the administrator has perceived.[7]

The word planning means different things to different people--some react positively (who can be against it?) and some react negatively (who's got time for it?). Planning may be defined simply as the intentional, rational process of devising a future course of action. Planning is nothing more than preparing for the future, whatever form that preparation takes. All individuals who survive for any length of time do it.

A Vocational Education Program Planning Model

The local vocational-technical program planning process is a very important, complex, and involved process. Effective planning entails the development and use of a continual source of student data, labor market data, and evaluation data, on which important program planning decisions can be based.

The educational planning process can be and has been outlined in many different ways. Any comprehensive planning process, however, may be described basically as a problem-solving activity. In vocational education, comprehensive planning involves the use of a logical and systematic procedure to answer planning questions such as the following: What are the student and labor market needs of our community or area? What programs and services should our college or school provide to meet these needs? How will we monitor the process and know whether we are achieving our goals? The result of a well-conducted comprehensive planning process should be the design, implementation, and evaluation of vocational eduction programs that meet the identified needs and goals.

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6. Carl D. Perkins Vocational Education Act, U.S. House of Representatives, October 2, 1984.

7. Local Educational Agency Vocational Education Program Planning Guide (Charleston, WV: State Department of Education, Bureau of Vocational, Technical, and Adult Education, n.d.), p. 1.

A suggested comprehensive vocational education program planning model is presented on the next page. The planning model presented, whether followed in whole or only in part, can help give you direction for organizing and conducting a planning effort that will serve to improve and strengthen your local vocational-technical program.

Due to space and time considerations, only steps 2, 3, and 4 can be addressed in this paper. Even those three steps can be addressed only briefly.

Assessing Individual Needs and Interests

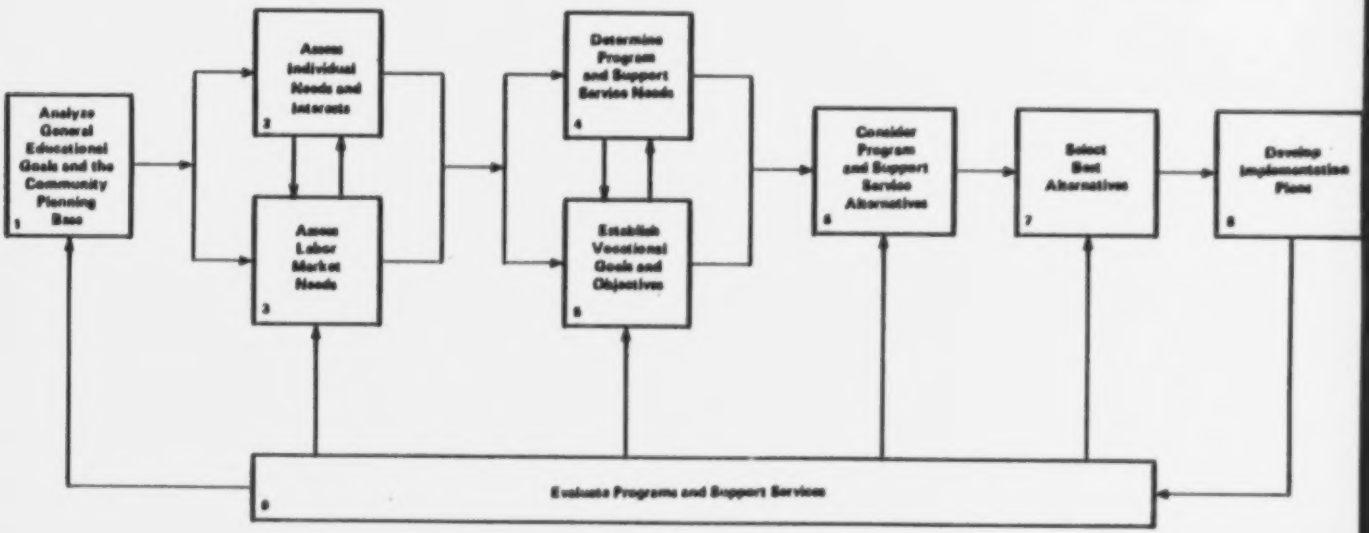
When planning for the nature and number of vocational programs to be offered, there is often considerable debate concerning whether labor market considerations or the interests and needs of students should be the governing factor. Programs that are established on the basis of employment opportunities alone could potentially end up with no or very few students enrolled. Programs established on the basis of student interests alone, on the other hand, could potentially end up training students for jobs that do not exist. The exact balance to be struck between student and labor market needs is an important issue that the vocational program planner must come to grips with. Clearly, however, both variables need to be taken into account.

The amount of weight given to students' program interests can be increased when one also includes an analysis of student needs. Interest scores are more likely to be realistic when students have had an opportunity, through career education or vocational orientation courses, to study and explore the various career clusters. It is very important to learn as much as possible about your prospective students so that the programs and support services offered are designed to be relevant to their present level of career development. Knowledge of students' aspirations, plans, and expectations permits you to tailor your offerings to real needs and interests.

There are numerous methods and techniques that can be used to help assess individual needs and interests, including assessment of (1) student vocational and educational interests, (2) student needs, (3) student abilities, and (4) adult training and retraining needs.

Students' Vocational and Educational Interests. Students' interests may be thought of as personal preferences for certain types of schooling and for employment in specific occupational or career areas. Both vocational and educational interests are generally flexible at the junior high level and gradually become more specific and fixed as persons become older. Students' occupational interests should be considered tentative until students have had a chance to learn firsthand about a variety of occupational areas and to explore those areas that are of interest to them.

VOCATIONAL EDUCATION PROGRAM PLANNING MODEL



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Because both vocational and educational interests are subject to change, it is strongly recommended that a systematic data-collection procedure be established whereby some information on student interests is gathered each year. Many schools in the United States survey all students' vocational interests every second year, from junior high through high school.

Instruments for the identification of student interests are readily available, including (1) standardized vocational interest surveys, such as the Kuder Form DD Occupational Interest Survey and the second edition of the Ohio Vocational Interest Survey (OVIS II); and (2) state or locally developed vocational program interest surveys. In many U.S. school systems, the guidance and counseling department already administers one or more standardized surveys on a periodic basis to provide useful information for counseling individual students.

Regardless of the student survey instrument selected or developed, it should contain items that will give you the following information about your students:

- Educational objectives
- Vocational or career objectives
- Vocational program interests
- Need for occupational information or counseling

When administering and interpreting vocational interest surveys, remember the following:

- List not only programs that you now offer, but a range of other possible programs as well.
- Arrange vocational programs on the survey in hierarchical fashion, with smaller, more-specialized program categories nested within broader categories. In this way, if not enough interest is registered in a specialized category, a broader, less-specialized program could be offered.
- To make the student interest survey as accurate and useful a tool as possible, administer it using the same forms and procedures each year. Continuity will allow you to calculate the average difference between the expressed interest and actual enrollment.

Student Needs. A variety of student-needs data--including information on special/exceptional needs--is generally available through the school or college guidance office. Students considered to have special or exceptional needs include those who are physically and emotionally handicapped, who are economically or educationally disadvantaged, who are bilingual, who have special guidance or counseling needs, and who need help in overcoming sex bias and stereotyping.

Postsecondary institutions should make every effort to obtain relevant student-needs data from prospective students and new enrollees. Secondary

administrators should be able to obtain the necessary information from cumulative records, enrollment forms, and transcripts available in the guidance office or main office.

Student Abilities. Student-abilities data has long been collected and used by vocational-technical teachers, counselors, and administrators. Therefore, it will be given only brief treatment here. The brevity of coverage should not, however, be construed in any way as meaning this type of data is unimportant in program planning. Before a student should be enrolled in a vocational program, he or she should possess the ability to benefit from such training. The student's ability can and should be assessed through the use of various aptitude tests, such as the General Aptitude Test Battery (GATB); intelligence (IQ) examinations; and standardized and teacher-made achievement tests.

When assessing a student's ability to benefit from training, it should be remembered that nearly every student can benefit from vocational education, given the proper instructional program and methodology. Educators must be careful not to "screen students out" of vocational education when it would be better to "screen them in." Using an individualized, competency-based approach, for example, slower students can be helped to select competencies within their reach so they can exit from the training program with entry-level skills in one of the suboccupations or step-off points.

Another aspect of abilities-testing that has gained deserved prominence in vocational education is that of competency testing. This type of testing normally involves the use of both criterion-referenced knowledge and performance tests. For example, students must be able to demonstrate that they possess the prerequisite skills and knowledge before being admitted to an advanced technical program. Once admitted to a course of study, the students must also demonstrate their attainment of the necessary competencies before they are certified as graduates. To admit students who do not possess the prerequisite skills and knowledge needed to be successful in advanced technical or vocational programs does neither the school nor the students a service. Where possible, less able students need to be enrolled in remedial or developmental studies programs to ensure that their basic skills and other learning abilities are adequate before enrolling them in the regular vocational program.

Adult Training and Retraining Needs

Needs identification should not be limited to the "regular" secondary and postsecondary students. Other groups deserve special consideration because they are often overlooked or have special needs, These groups include individuals who are unemployed or underemployed, adults who need retraining, single parents and homemakers, the incarcerated, and persons who need help in overcoming sex bias and stereotyping. These groups may also include early school leavers, persons returning from the military, persons wishing to enter

gainful employment for the first time (e.g., housewives), and other "nontraditional" students. Because of their varying degrees of educational and employment experience, such people require separate consideration by local administrators so that the institution's occupational training programs are designed to be of benefit to them.

Adult training needs can be identified, in part, using traditional means (e.g., community surveys). However, new and effective ways of assessing the specific training needs of adults must be devised and implemented.

While the need to give more attention to the needs of adults may at first glance appear to be an additional burden and responsibility for vocational educators, it can also become a blessing. With declining numbers of school-age youth, the expansion of adult programs may permit the continuation of comprehensive vocational and technical education offerings that might otherwise have to be reduced or even phased out. Also, many teachers and administrators, who have tried intergenerational programming (mainstreaming adults into secondary programs as space permits), attest to its positive, motivational, and maturing effects on the younger students.

In summary, cumulative data on individual needs, interests, and abilities are essential input in the vocational program planning process. Most schools and colleges already have available some of the data needed. Other data will need to be collected to allow for better planning and more comprehensive assessment of student needs. Most schools have counselors and other staff members who are trained and skilled in the various facets of needs assessment, and their expertise should be fully utilized.

As a vocational program planner, you should use strategies that will maximize the human development and personal satisfaction of individuals over time. Planning educational programs on the basis of the real needs, interests, and abilities of the enrollees will minimize the extent to which students become "captives" of the system and maximize their self-fullfillment. If there is significant student need and interest in a vocational program or supportive service, and if that program or service will provide economic, academic, or other worthwhile benefits to the students, then there is a strong likelihood that the program is justifiable and worth offering.

Assessing Labor Market Needs

In the United States, state department of education policies and federal legislation require local educational agencies to justify each instructional program for which funding is sought by showing a clear labor market need for the program. The data on employment opportunities, which are required in the annual and long-range plans for vocational education, are often derived from a variety of sources such as local employer surveys, area labor skills surveys, statewide surveys conducted by the bureau of labor statistics or the state employment service, and national studies and labor market analyses prepared by the U.S. Department of Labor. In most states, the department of education

works closely with the state employment service to develop and share labor market data with local vocational education planners.

Labor-market-needs data can and must be used on a continual basis by local vocational education planners. At the same time, it needs to be said that the processes used in translating labor-market-needs data into corresponding vocational programs designed to meet those needs is not well developed. Those who expect a simple solution to the data analysis and translation problem--a complex process at best--will be disappointed. It must be recognized that labor-market-needs information is an important source of vocational education planning data--but that it is not the only source.

The assessment of labor market needs involves assessment of both the labor demand and the labor supply. Labor-demand data are used to provide an estimate of the number of individuals with particular skills who are needed or will be needed in the near future. Labor-supply data provide an estimate of the number of individuals, available from all sources, who are likely to enter the labor market with particular skills. Given both an estimate of labor demand and an estimate of labor supply, you can, by simple subtraction, determine the likely human resource needs that will exist.

Having this type of information available as you develop your vocational program plans will help you to answer the following central questions: For what occupations should we be providing training? How many persons should we be training for these occupations? This type of information should indicate the potential the institution has of placing its various graduates in gainful employment situations.

It is vital to keep this job placement goal in mind; thus, you need to concentrate on the individual's need for employment, as well as on the employer's need for skilled workers. Since actual job placement is probably the most important criterion in evaluating the success of existing programs, and potential job placement is probably the most important criterion in assessing the need for new programs, the importance of obtaining the best possible estimates of labor supply-and-demand data becomes obvious.

In obtaining the necessary labor supply-and-demand information for your planning, the following decisions need to be made in order to determine what information will be relevant and what methods you will use in order to obtain that information:

- What is the geographic region for which labor supply-and-demand information is required?
- What occupational boundaries are relevant to your planning?

Geographic Limits of Labor Market Area. The labor market area can be defined as an area for which there is a concentration of economic or industrial activity and in which workers may change jobs without having to change their residence. This definition assumes that workers are not going to move in search of employment, or that if workers should move, they will no longer be considered as part of the area.

However, a labor market area can be a physical region much larger than that circumscribed by normal community distances. Thus, some definitions of the geographic boundaries of a labor market are affected by the willingness of labor to move from one city to another. Such definitions are usually occupationally dependent. The labor market for brain surgeons, for example, is the entire nation or larger. Nevertheless, despite much talk of labor mobility in the United States, labor movement is relatively low within most of the occupations served by vocational programs.

There are many ways of determining what labor market area would be relevant to your particular vocational planning effort. One option is to accept and use one of the several established labor market areas that are commonly used for such planning decisions.

Another way of determining the appropriate geographic boundaries for your school or college is to survey your former vocational students to determine how far afield they actually went in order to obtain employment. In a practical sense, however, the labor market area should be a region for which analysis of employment-and-training data is valid and for which data are available or obtainable.

Occupational Boundaries of Labor Market. Your labor market also functions within occupational boundaries. In other words, the information you need concerning the supply and demand for labor should be limited to information concerning the availability of and need for people with particular occupational skills. In the United States, the precise names or titles of occupations are listed in the Dictionary of Occupational Titles (DOT). This dictionary lists occupations in a hierarchy, with several large occupational categories broken down into smaller subcategories. Since vocational planners are concerned with occupations requiring skilled and technical workers, the occupations requiring professional workers (with four or more years of college) need to be excluded.

Once you have determined the geographic or labor market area to be considered and the particular occupations to be included in the planning effort, you can then secure the pertinent labor-market-needs information by assembling existing labor-market-needs information, using appropriate methods to generate new information, or both.

Labor Demand Information. Estimating labor demand information for educational planning purposes includes two tasks: the selection and use of appropriate forecasting techniques, and the assembling of existing labor-market-demand information.

While forecasting, or projecting, future occupational employment opportunities is far from a perfect science, the use of forecasts can help you identify the occupations most likely to provide employment for your graduates. The accuracy of labor forecasts is related to the predictability of what will happen to the general economy and to various employers, businesses, and industries. Forecast data are generally more accurate at the national level

and less accurate at the local level. Despite their many limitations, forecasting techniques are legitimate planning tools, especially when used by experts. A general understanding of the various, common forecasting techniques--including their strengths and limitations--can make labor market data more useful to you as you develop your program plans. Only the use of employer surveys is discussed here.

Employer surveys can be useful for gathering the labor market information required in annual and long-range vocational education plans. They have frequently been used to collect information pertaining to the supply of and demand for skilled labor. In these types of surveys, employers are frequently asked to provide their best estimates of both employment and training needs.

Data can be collected rather quickly from whatever geographic area and whatever agencies and organizations are desired. Heavy responsibility for the quality of the data supplied is placed upon the employers being surveyed. Employer surveys have the additional advantage, however, of improving communication between the school or college and employers.

Employer surveys should, where appropriate and necessary, be used for vocational planning purposes but, as with the other approaches, the limitations inherent in this approach should also be kept in mind. In some cases, employment opportunities evidence collected through local employer surveys has been used to justify offering vocational programs that could not have been supported by national or state level data.

Existing Labor Demand Information. There are three principal sources of labor demand information available. These are (1) national publications and agencies of the federal government that describe national labor demand information, (2) state publications and agencies that supply labor demand information relevant to a state and its regions, and (3) local publications and agencies that supply demand information about particular local employment areas.

Program planning is an ongoing activity for local vocational administrators. Consequently, you will need to ensure that labor market information relevant to important planning decisions is continually amassed and updated. This can be made an important responsibility of the local advisory council and the occupational advisory committees within the school or college. With appropriate guidance and leadership, such committees can effectively, and continually, search for and collect data that are available for their occupational area.

Labor Supply Information. Once you know the total amount of current and projected labor demand by occupation, you need to determine the supply that exists to meet those demands. The total supply can be said to consist of all persons available to fill work positions created by demand across all occupations. It includes employed and unemployed persons available to take jobs. In other words, the total supply comprises the current labor force, plus the net entry of new potential employees.

Individuals can enter the labor force or the ranks of an occupation through three primary methods. They may move into the labor market from another geographic area. They may live within the labor market area and become available for employment because they are changing occupations, have left the military, are currently unemployed, or are entering the paid labor force for the first time (e.g., homemakers). And they may enter the labor force upon graduating or otherwise exiting from educational programs.

A complete analysis of the supply of trained graduates involves the identification of all principal training agencies and their output of graduates by occupational areas. Agencies considered should be those offering preparatory programs for training students who will enter full-time, skilled employment upon completion of the programs. The following agencies should be included in any supply analysis: (1) public secondary and postsecondary vocational and technical schools, (2) community colleges, (3) private trade and technical schools, (4) private business schools, (5) state trade and technical schools, (6) industry-sponsored training programs, (7) government-sponsored training programs, and (8) two-year programs in four-year colleges/universities.

Entry rates for individuals differ widely from program to program and occupation to occupation. For example, graduates of medical schools enter employment in the medical field almost without exception, probably because of the extensive amount of time and money they have invested in their training. For occupations in which training is less rigorous, only a fraction of the program graduates may enter employment in the occupational area. In those occupational areas, vocational educators need to train more persons than there are job opportunities in order to meet labor demand.

Three steps should be followed in estimating future labor supplies:

1. Appraise the current supply in the particular occupation

2. Estimate the total number of individuals expected to enter occupations between the planning year and the year of forecast

3. Make allowances or adjustments for expected losses through death, retirement, and out-migration

Once the annual labor supply is known, the data collected can be compared to annual labor demand data to obtain a close estimate of the unmet needs each year. These estimates can provide quantitative measures of actual training needs each year. Once the necessary information about supply and demand is collected and processed, supply-demand relationships can be determined.

Determine Program Needs. The fourth step in the comprehensive planning model involving--determining vocational program and support service needs--is begun after community, individual, and labor needs data have been obtained. It requires that all the data obtained be summarized and displayed so that the various vocational programs and support services needed can be fully identified.

The goal of this step in the local planning process might be described as an effort to identify all the various vocational programs and support services needed to satisfy all the individual and labor market needs of the community or area. At this point in the process, the local administrator and other planners should think in terms of the ideal, forgetting for the moment, if possible, legal, financial, and other constraints that may in the end prevent achieving the ideal. Unless you first ascertain what the ideal would be, your vision of what is possible is likely to be too narrowly confined to thoughts of what has been done in the past.

This is the stage of the planning process during which imagination and creativity should be given free reign in terms of the innovative ways in which the college or school might satisfy real needs. The staff planning committee and advisory council should not confine their thinking to the conventional programs and services used to meet needs. Instead, they should explore the possibilities of new courses, new services, and modified programs.

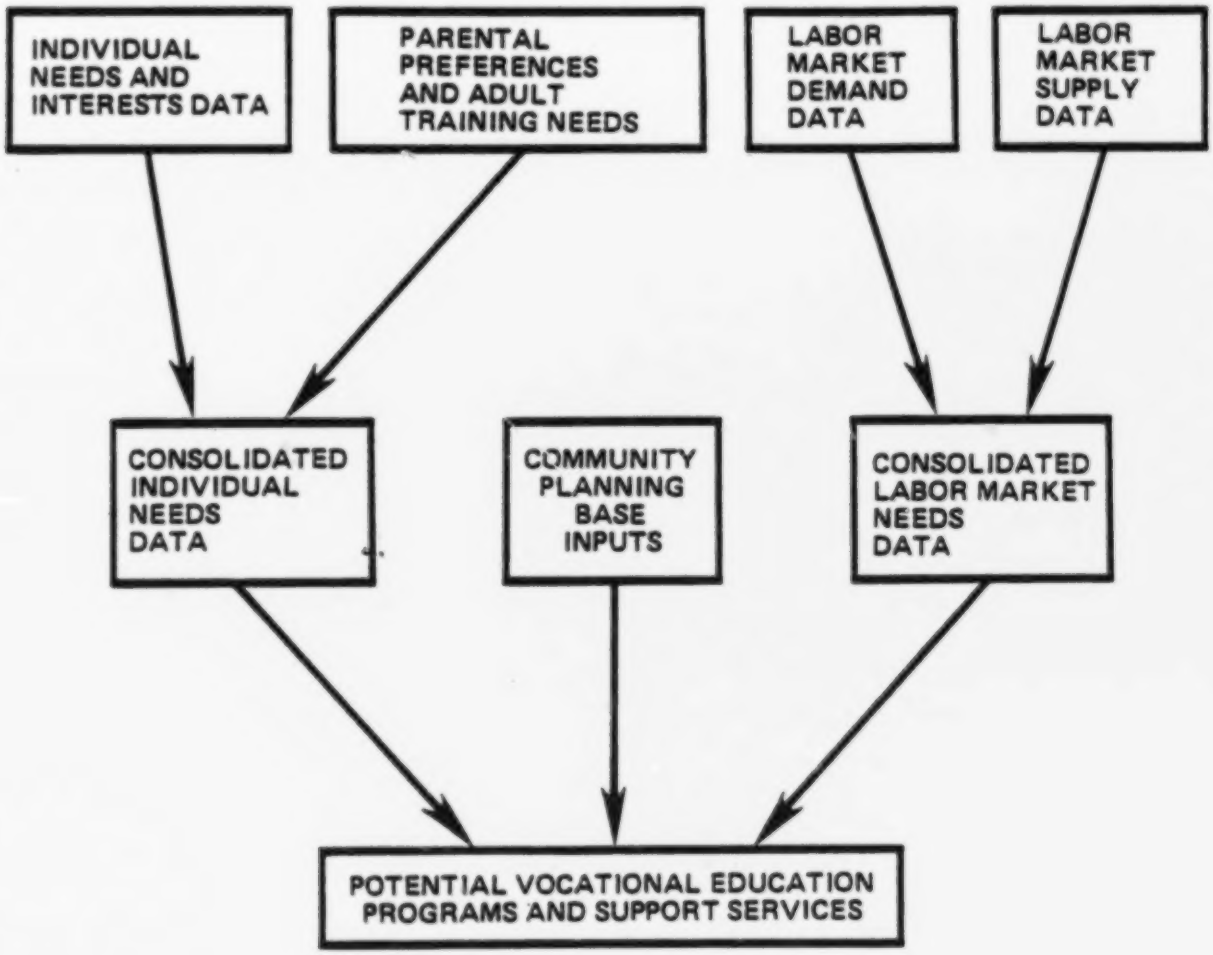
This is also the time to remember the importance of involving those who will be affected by and responsible for implementing any proposed changes in programs or services. Obtaining the input of all appropriate persons can be a powerful factor in securing school and community support for any recommended changes.

Analysis and Synthesis of the Data Assembled. Before planners can dream about the new and innovative ways in which vocational needs can be met, it is necessary to summarize the data assembled in a manner that permits it to be understood, studied, and used as a basis for planning recommendations. Unfortunately, there is no simple or best format, process, or procedure for analyzing and using all the data available. In fact, if you review what others have done in the way of comprehensive vocational education needs assessment, you will find that a wide variety of approaches, techniques, forms, and instruments have been successfully used.

Some general guidelines and procedures for processing and using such data can be offered, however. For the purposes of this discussion, three basic types of data will be considered: (1) community data, (2) individual needs data, and (3) labor needs data. By carefully summarizing, analyzing, and interpreting these various inputs to the needs assessment phase of the planning process, you provide the basis for everything that follows in sound educational planning.

Because the needs assessment process requires data inputs from a variety of sources, it becomes imperative that some structure be given to the process. There must be a conceptual framework that illustrates all the essential elements of the process and shows how they relate to each other. An expanded version of the needs assessment phase of the vocational education program planning model is presented on the following page.

NEEDS ASSESSMENT PHASE


INDIVIDUAL NEEDS AND INTERESTS DATA
PARENTAL PREFERENCES AND ADULT TRAINING NEEDS
LABOR MARKET DEMAND DATA
LABOR MARKET SUPPLY DATA
CONSOLIDATED INDIVIDUAL NEEDS DATA
COMMUNITY PLANNING BASE INPUTS
CONSOLIDATED LABOR MARKET NEEDS DATA
POTENTIAL VOCATIONAL EDUCATION PROGRAMS AND SUPPORT SERVICES

At a glance, it can be visualized how the various inputs in the needs assessment phase lead to an identification of the various vocational programs and support services that are needed. In simple terms, Step 4 in the planning process results in the identification and documentation of all the problems or needs that potentially could be met through appropriately designed and operated vocational or technical education programs and support services.

The most important factor that needs to be remembered at this point in the process is that, to be useful, the data obtained, regardless of the source, must be summarized and presented in some meaningful form so that the program planners and various decision makers will be able to understand the data and recommend programs and/or services that can be justified on the basis of real needs.

Once all the community, individual, and labor needs data have been synthesized, the analysis process to determine program and support service needs can begin.

Analysis and Synthesis of Existing Programs and Services

Before the final determination of needed vocational programs and support services can be made, it is essential to consider available information about existing programs and services. Although not an all-inclusive list, the following represent some of the major sources of information to consider in assessing needs as they relate to existing programs:

- Follow-up surveys of former students
- Surveys of present students
- Employer surveys (reactions to programs)
- Parent and/or adult surveys (reactions to programs)
- Inputs from school personnel, including vocational teachers, general education teachers, personnel services staff, and administrators
- State department supervisory-visit reports
- State department program evaluation reports
- Advisory committee and advisory council recommendations

While most vocational education planning efforts will not have available, or want to collect, all these types of data because of resource limits (e.g., of personnel and funds), they should all be considered. On the other hand, almost all schools and colleges will have some of this information readily available (e.g., in the form of follow-up survey data, program evaluation reports) because it is required by law or state department procedures. Other data, such as school personnel reactions and advisory committee recommendations, are so essential to effective planning that, if the principle of involving those concerned is to be adhered to, such data should somehow be assembled and analyzed if not already available.

This type of analysis of existing programs and services should also include some assessment of other public, private, government-sponsored, and industry-sponsored training programs and services provided in your planning area. The focus of the analysis should be on what student and community needs are being met by the existing programs and services, and what, if any, needs related to these programs and services are yet unmet.

Identification of Programs and Services Needed

This activity involves the identification of the vocational programs and services needed, using (1) all the information that has been gathered about community, individual, and labor needs; and (2) the data obtained from the analysis of existing programs and services. The pulling together of all the major data inputs in order to arrive at a documented list of the vocational programs and support services needed is illustrated on the following page.

This activity has been described by some planners as a type of "discrepancy analysis." The analysis of the community, individual, and labor needs data results in a description of "what ought to be," while the analysis of existing programs and services results in a description of "what currently is." Wherever a gap exists between "what is" and "what ought to be," it may be said that another need or problem still exists. Once these problems or unmet needs are identified and documented, they can be prioritized, and recommendations can be made for alleviating them. At least four types of recommendations may be the product of this problem-solving activity. These recommendations will normally include the following:

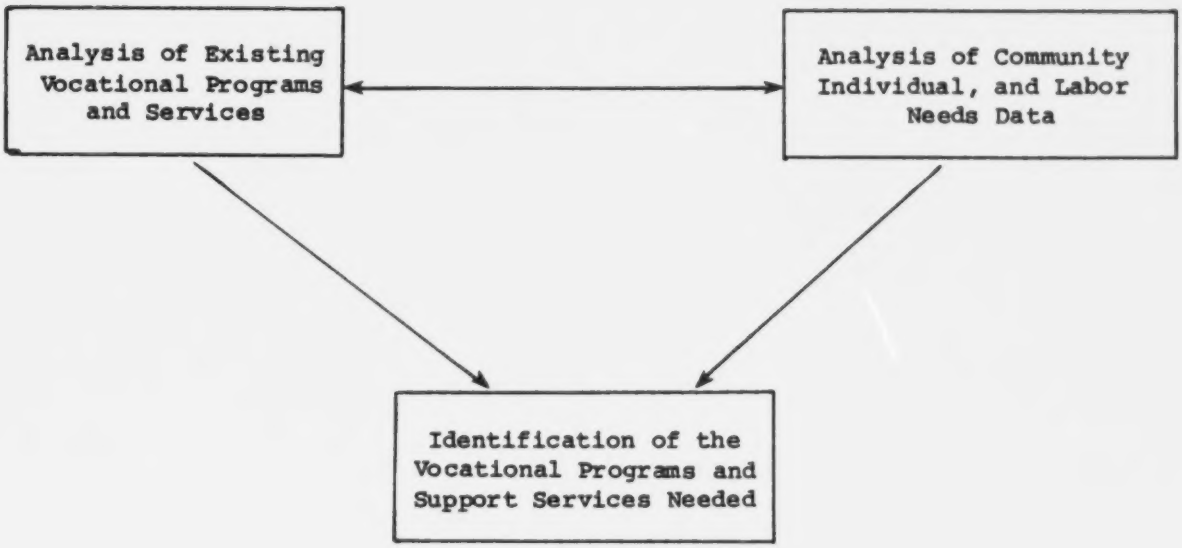
- Recommendations concerning what programs and services should be continued as is
- Recommendations concerning what programs and services should be modified
- Recommendations concerning what programs and services should be discontinued or phased out
- Recommendations concerning what new programs and services should be added

The identification of needs or problems should not be viewed as criticisms of the current programs and services, but as deficiencies that should help planners and decision makers plan vocational education programs that will better serve the needs of the institution's clientele.

Competency Identification

No single curricular element is more important to establishing a CBE system than the careful identification of competencies. Regardless of the instructional delivery methods used, to be competency-based a program must be based on the competencies (tasks) identified by successful workers in the occupation through a valid occupational analysis process. While several valid approaches are available, you must decide which approach is most acceptable.

RELATIONSHIP OF MAJOR DATA INPUTS
TO PROGRAM PLANNING


Analysis of Existing Vocational Programs and Services
Analysis of Community Individual, and Labor Needs Data
Identification of the Vocational Programs and Support Services Needed

One approach to competency identification that should be considered unacceptable is allowing the teachers or instructors to identify the competencies themselves. Either occupational analyses that have been appropriately developed elsewhere should be obtained and verified locally, or local analyses involving the input of expert workers from business and industry should be conducted.

Not only must the competency identification process be valid, it must also be appropriate for local conditions and needs. Although many occupations do not differ nationally from region to region, others do, and those differences must be taken into account. While competency lists are widely available, they must be carefully reviewed to determine their applicability to local conditions. Providing for local "ownership," particularly by instructional staff and area employers, is an excellent way to ensure meaningful use of each competency list. Unless staff and local employers endorse the competencies, the competency list will likely end up as nothing more than a wall decoration.

In the United States, valid competency lists for a variety of vocational programs are available from several sources, among them the Vocational-Technical Education Consortium of States (V-TECS), the six Regional Curriculum Coordination Centers, and many state-department-supported curriculum laboratories. Although these resources are readily available--and at

relatively low cost--it is recommended that they be subjected to local verification by a program advisory committee or local incumbent workers.

When existing competency lists cannot be located or appear to be inadequate or inappropriate, another option for competency identification is DACUM (Developing A Curriculum). Begun in Clinton, Iowa, in the late 1960s, the process has been used extensively in the United States and Canada. DACUM, involves 8 to 12 local expert workers in a structured brainstorming session for 2 or 3 days to generate a comprehensive list of worker duties and tasks.

The National Center has further developed and refined the original process by adding a number of quality enhancement procedures. The National Center has developed a DACUM Handbook and regularly conducts DACUM Facilitator Institutes to train persons as certified facilitators.

While DACUM is an excellent means of identifying valid competencies and securing a feeling of local ownership, the process requires careful planning. Typically, instructors identify expert workers in the area, and companies are contacted and requested to release workers for the two- or three-day session. Contacts with local business people can be invaluable in helping to secure DACUM panel members. In addition, an experienced DACUM facilitator, skilled in group dynamics and the DACUM procedure, must be secured to conduct the analysis session.

As an administrator, you must weigh the relative costs and feasibility of each of these methods against the outcomes and potential gains of each. As always, program instructors and department heads should be involved in this decision-making process. However, you must consider the impact of selecting one competency identification procedure over another and the impact of using several different approaches, with products that vary in format, wording, and scope. For more about DACUM, see Attachment C entitled "A Tool for Developing Curricula."

Task Verification

Verifying the occupational tasks confirms that the items listed in fact describe the occupation and, specifically, the local occupational situation into which students will be placed. To structure the verification process, certain decisions must be made: (1) who will conduct the verification, (2) who will participate in the actual verification, and (3) what questions will be asked. In all likelihood, during the decision-making stages, there should be major involvement of three parties: (1) an administrator, (2) staff responsible for conducting the verification (e.g., those designated as curriculum developers), and (3) advisory committee members.

A member of the administrative staff must be involved to set up initial meetings with verification staff and advisory committee members. It is the administrator who must explain to the group what decisions must be made and what and how they can contribute.

Staff who will conduct the verification should be involved. Again, if staff are to believe in and use the results of curriculum development, they must understand its importance. Their being involved throughout the development process will help them feel a part of this important procedure and greatly enhance articulation between academic and vocational program areas. Since they have been workers in their field, their inputs are critical.

Advisory committees must be involved. In the United States, advisory committees have become a part of vocational education at both secondary and postsecondary levels. The advisory committee for a particular service area and the program advisory committee or craft committee are groups of citizens with expertise in the world of work who are appointed in order to provide vocational instructors with advice concerning preparation of students for employment. As such, they have a key contribution to make to curriculum development, especially to its articulation with other programs and activities. They can provide suggestions concerning what verification questions should be asked, what techniques would secure the most cooperation from employers asked to participate in verifying the analysis, and what employers should be involved. They can also participate themselves in the verification of the list. Clearly, if your occupational program has no advisory group, one of your first steps is to appoint such a body.

At the planning meetings involving these persons, the following decisions will need to be made, with input from all members of the group:

Who will conduct the verification process?

- A member of the administrative staff, such as an evaluation specialist
- A specially appointed and trained group of faculty
- A previously appointed staff, such as a team of curriculum developers
- Other personnel

What questions will be asked?

- If you want only to verify the skills as real and relevant, you can ask incumbents simply to review each item on the analysis and check it if it is actually performed as part of that job.
- If you wish to gather other information relevant to sequencing and curriculum development, your verification instrument or interview could include other questions such as (1) Is the task performed by beginning workers? (2) How often is the task performed? (3) How important is the task? and (4) How difficult is it to learn to perform the task? Some other task rating options are listed in Attachment D.

Who will be asked to verify the tasks?

- Employees (incumbent workers in an occupation)
- Immediate supervisors of such workers
- Employers locally who hire workers in this area
- Advisory committee members

What key activities need to occur and what will be the schedule for their completion?

- Design of instrument or questionnaire
- Pilot test of instrument
- Contacting of respondents

You must ensure that whatever verification process is selected is feasible--and effective--within your budget. Once the decisions have been made, your role is that of facilitator--making sure any necessary forms are processed through your office quickly, being aware of the progress being made, and furthering that progress where possible. If some verification is to be done through interview/observation techniques, you can facilitate that process through such devices as providing the means for training the interviewers, or writing letters of introduction over your signature to help interviewers gain the cooperation of employers. At any rate, the point is that, even though verification will probably not be your direct responsibility, you will need to understand the process, help with the decisions, and monitor progress if you want a good job to be done.

Conducting Task Analysis

Each verified task statement needs to be analyzed--to be broken down into at least the knowledge, skills, and attitudes required to perform it. This step serves several very important purposes, one of which is to provide teachers with a more detailed basis for developing instructional materials. More importantly, however, it helps the curriculum developer(s) to identify the relative "size" of the competencies listed. No matter how carefully defined and structured the analysis process has been, competencies inevitably vary in size, i.e., in the amount of time and effort required to teach or to learn that skill. By analyzing each competency, one can identify and remedy these inconsistencies.

It is helpful to provide curriculum developers with a simple chart to use to structure the completion of this step (see Attachment E). Using such a chart, one can analyze each competency to determine (1) the steps involved, (2) the cognitive (knowledge) elements involved, and (3) affective (attitude) elements involved.

Often times, a more complex form (see Attachment F) is being used for technical, supervisory, and managerial tasks. It requires analyzing each verified task to determine (1) the steps involved, (2) the tools, equipment,

materials, supplies, people needed, (3) safety factors, (4) related knowledge (math, science, language) required, (5) the attitudes that are importnat, and (6) the performance standards expected. In some cases we are also idlentifying all the decisions that must be made by the worker, what cues the worker is given to aid in the decision-making process, and the errors that will result if incorrect decisions are made.

Developing Competency-Based Instructional Materials

Although the use of individualized learning packages is not an essential element of CBE, most fully functioning CBE programs have recognized the potential of this approach for focusing on the individual development and evaluation of the specified competencies for each student.

This means that, in a CBE system, the instructional development process generally moves directly from the identification, analysis, and clustering of competencies to the development (or selection) of learning packages and strategies to deliver on those competencies. The conventional approach--involving as it does more emphasis on content areas and group instruction within specified blocks of time--moves instead to the development of overall plans for a course or program (the course of study), and then to unit and lesson plans.

In many institutions, individual instructors are given total responsibility for developing, continually updating, and revising the learning packages students will use. Given a list of the competencies to be achieved by students, they decide how each competency will be taught--what prerequisites are required, what instructional strategies will be employed, what criteria will be used to evaluate student performance. These decisions are used to organize the content of the learning packages.

In other institutions, particularly when more than one instructor will be using the materials, the development of learning packages is a team effort. An efficient and productive materials-development team consists of an educational technologist, a typist, and one or more instructors. With CBE, a new teacher may "inherit" from another instructor, not a course of study and series of lesson plans, but a list of competencies and a series of learning packages.

Although some states and districts are developing (and making available) CBE materials in some occupational areas, high-quality materials do not presently exist in all occupational areas. Thus, it is more than likely that staff involved in competency-based instruction will need to develop their own learning packages or at least work with others in a team effort. To assure the production of high-quality, usable, effective materials, you will need to provide funds and staff time for the development effort and ensure that staff have the needed training. Some institutions schedule workshops and bring in outside consultants with expertise in CBE and the development of learning packages.

There are at least two types of learning packages, with some definite advantages and disadvantages inherent in each. Learning guides are simple materials. They are reusable paks containing directions for learning activities and explaining where to go for needed resources. They may be developed relatively quickly by school personnel, and they are fairly inexpensive to reproduce. Obviously, their effectiveness is dependent upon the quality and availability of the support resources to which they refer. See Attachment G for a suggested format, selected components, and some development guidelines.

Modules, which are basically self-contained, transportable, and consumable in nature, have the advantage of being completely under the control of the developers. The instructional content and approach can be tailored to meet the particular needs of the program, and few outside resources are needed. Self-contained modules, however, can be very time-consuming and expensive to develop, and they demand greater expertise in their production. Most CBE programs are now using learning guides, adding some instructor-produced instructional materials to enhance the learning activities.

Assessment Procedures

As an administrator in a school or college that has implemented CBE, you set the tone for a productive, positive learning environment. Assessment of student knowledge and performance is one of the most difficult and potentially divisive issues in CBE. Before any instructional or organizational changes are made regarding assessment, you would be wise to examine your own assumptions about student assessment and to lead your staff in reaching consensus on a philosophy of student evaluation. In conventional educational systems, evaluation is based on a cumulative average of work done in a term or semester. In CBE programs, evaluation is based on successful attainment of individual competencies and on the ability to integrate the proper combination of those competencies in actual or simulated job situations. In conventional systems, a student's grade is affected by the accomplishments of his/her peers (norm-referenced). In a CBE system, students are rated according to occupational standards of performance (criterion-referenced).

Most CBE programs provide for students to first rate their own performance against established criteria. Once a student is satisfied that he or she can meet the criteria, then the instructor is asked to evaluate the performance. If the student's ratings are confirmed by the instructor's evaluation, the student can move on to work on another competency. If, according to the instructor's evaluation, the student cannot yet perform the skill successfully, the student continues to study and practice until competence is achieved.

In conventional systems, learning time is constant and achievement is variable. In a CBE system, learning time is variable and a student must achieve an acceptable level of proficiency on each skill.

Although existing institutional procedures and regulations may make it difficult, if not impossible, to conduct a truly competency-based approach to assessment, adopting a philosophy or approach to evaluation that is student-centered and competency-based will enhance the functioning of your CBE program, even in a conventionally organized institution.

Occupational Skill Competency-Testing

The growth of competency-based education has brought with it the need to provide standardized measures of student performance in vocational-technical programs and the proliferation of occupational tests developed to achieve that end. Federal criteria for evaluating vocational-technical programs and numerous state mandates to install performance based vocational achievement measures by specific target dates have spurred test development even more.

Today in the United States tests are being developed at all levels, from individual programs and local education agencies to state departments of education and consortia of states and agencies. It goes almost without saying that "wheels" are being reinvented many times over as developers seek to produce tests for programs that are quite similar. Understandably, there is increasing interest among developers in taking advantage of one another's efforts and building upon existing materials and measures.

In order to avoid great duplication of effort, programs undertaking test development need to be aware of existing resources and to obtain certain information about them:

- What tests or item banks already exist?
- What other projects are currently planned or underway that might parallel or overlap with local efforts?
- Which products have been systematically developed and verified?
- What systems have been established for developing and verifying test items?
- What mechanisms exist for sharing information and products?
- What testing-related services exist that might meet local needs?
- How can specific products or services be obtained?

Test Types and Features

A variety of test products and services are available, as follows:

Occupation-specific tests. Many occupation-specific tests have been developed in all program areas of vocational education and a wide range of postsecondary-level programs. Developed from occupational task lists, tests include criterion-referenced items that have been verified as representative of the competencies required of a worker in the occupation. These tests are usually keyed to locally developed task lists and/or broader item-bank

systems. They are most often shared in "hard copy" (paper) form, although some have been or are being placed in computerized systems that provide for on-line student assessment.

Item banks. Item banks, as denoted by the name, are collections of individual test items from which tests can be created. Stored by computer and keyed to task lists, they may be used to assemble item sets or to custom-design tests. V-TECS has the largest vocational test item bank, although some states are creating their own banks of items developed originally on paper.

Cognitive tests. By far the majority of competency-based tests are measures of cognitive achievement. Multiple-choice items predominate on cognitive tests and item bank entries, with a few true/false items mixed in. Cognitive tests may be paper-and-pencil or on-screen computer-based instruments.

Performance tests. A few projects have developed performance tests designed to measure achievement of psychomotor skills. Usually these are either (1) product or performance mastery checklists or record sheets or (2) work assignments designed to sample manipulative skills in the occupation. In either case the tests include criteria for evaluating student performance. Test props in some cases are provided as part of the package; in others they are listed and must be provided by the agency that uses the tests.

Affective measures. This aspect of evaluation seems to have received the least amount of emphasis. Work habits inventories are available for some programs; otherwise, specific items related to work attitudes items are sometimes included in either performance checklists or cognitive tests.

Selecting Tests For Local Use

When selecting items or tests for use in a local use, the questions of quality, appropriateness, currency, local relevance, convenience, and usefulness should be considered.

High-quality tests have the following characteristics:

- Validity and reliability. Good tests measure what they are intended to measure and they do so consistently. Tests and test items that have been developed by trained item-developers, reviewed by experts, validated in terms of importance to the occupation, and field tested with large numbers of students have a greater chance of being valid and reliable.
- Criterion-referenced. Criterion-referenced tests assess ability in terms of predetermined criteria which in turn are based on realistic occupational behaviors. (Norm-referenced tests, by contrasct, assess ability in relation to other students' performance.)

- Appropriateness. Tests should use appropriate evaluation methods for the types of objectives to be measured. Written, multiple-choice items, for example, can provide an effective measure of cognitive achievement (occupational knowledge). Only in limited cases (e.g., an occupation like bookkeeping, in which the job skills can be realistically simulated on paper) would paper-and-pencil tests effectively measure psychomotor achievement (job skills). Performance tests generally provide the best measure of psychomotor achievement.

- Currency. As occupational practices change, so must the related curricula, and evaluation instruments. A test that was carefully developed 10 years ago in a technological field is likely to bear little resemblance to current job requirements and performance standards for the occupation. Task lists and tests must be reviewed on a regular basis and updated as necessary to ensure that they reflect current competencies and performance standards for the occupation.

- Local relevance. No matter how carefully a test has been developed, it will not be useful unless it represents locally relevant occupational goals and objectives. Any test materials acquired from other sources should be carefully examined with this in mind and adapted, as necessary, to local conditions.

- Convenience and usefulness for local purposes. There are many factors to be considered in relation to convenience and usefulness. Many of these have already been discussed. Generally speaking, the questions to be answered are whether local needs will be best served by obtaining outside materials and which particular materials best meet those needs.

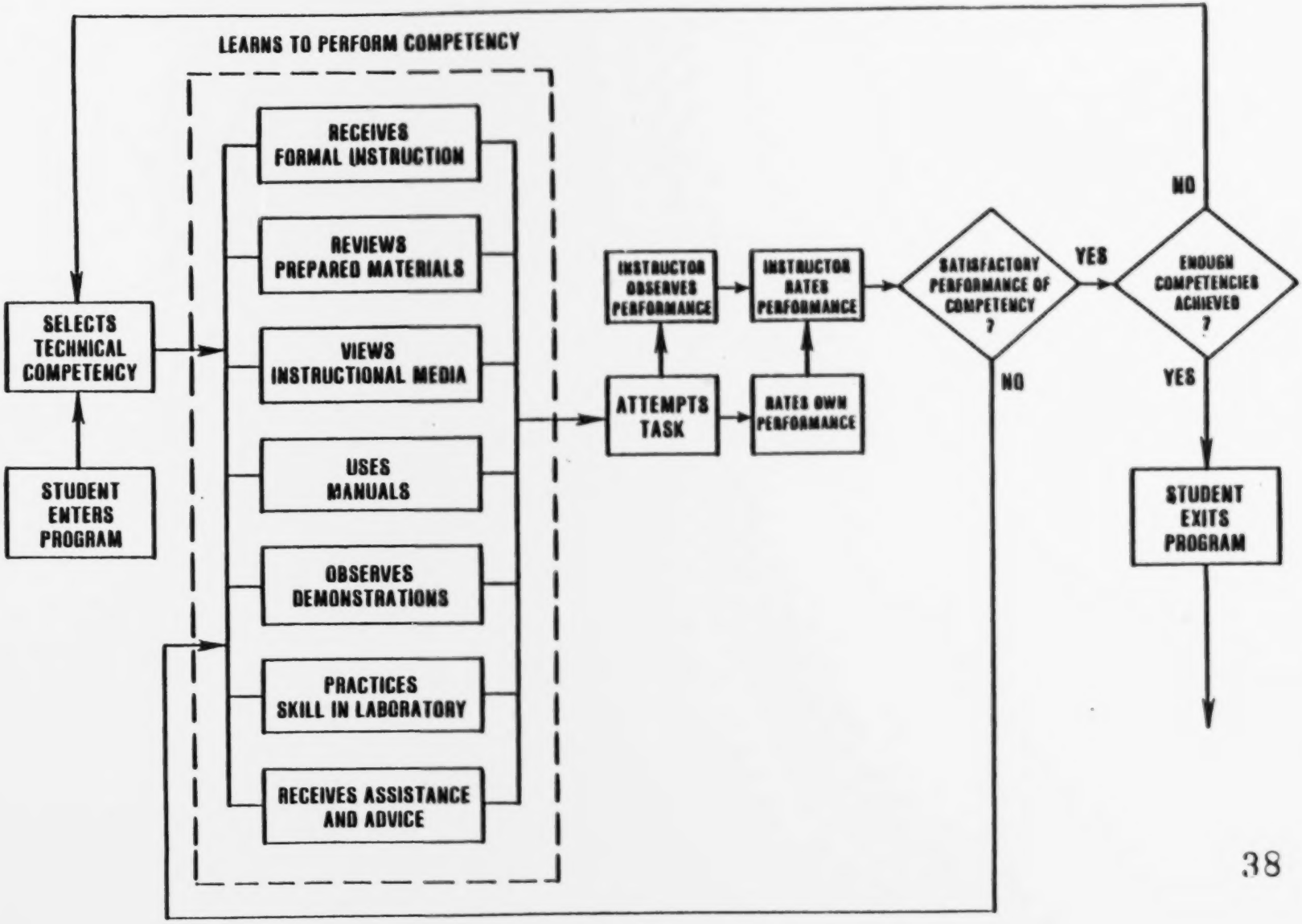
Summary

Whether you are implementing your own CBE program, helping another teacher or instructor implement such a program, or in the position of evaluating programs implemented by others, some means of formative evaluation can be very helpful. With the essential elements and the desireable characteristics in mind, a Competency-Based Education Program Evaluation Checklist (see Attachment H) has been devised to help you assess the status of any CBE program. It is recognized that different states and countries have somewhat differing philosophies about what CBE is and, hence, the checklist may have to be modified somewhat to fit local philosophies. Nevertheless, it is felt that the criteria listed reflect the minimum essential program elements that are generally recognized as necessary to assure overall program quality. It is hoped that the instrument can be used in a positive way to promote further the implementation of high-quality CBE programs that will better meet the vocational and technical education needs of our youth and adults.

The extensive work and resources that went into the development of our (a) 132 performance-based teacher education (PBTE) modules, (b) 34 competency-based administrator education (CBAE) modules, (c) 34 competency-based career guidance modules, (d) 54 enterpreneurship modules, and (e) our DACUM Handbook

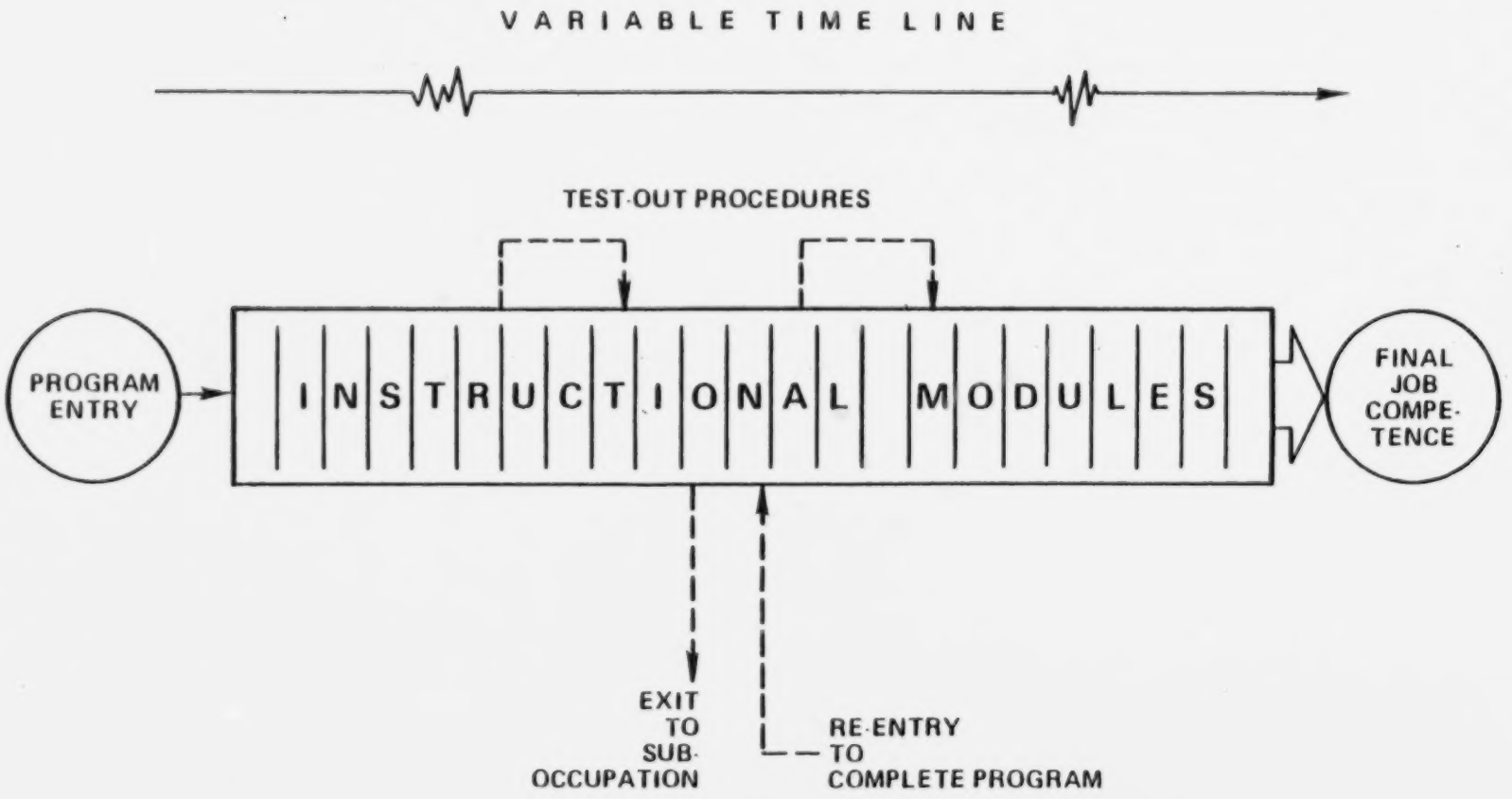
should give you a feeling of the major importance that the National Center attaches to this innovative and rapidly worldwide growing curricular approach to technical and occupational education. CBE--the most humanistic and realistic approach to occupational education devised to date--is here to stay. The challenge to implement CBE and improve our programs by so doing is ours to accept. We at the National Center stand ready to help any state, country, or person who wants to move ahead with CBE.

CBE STUDENT
LEARNING-EVALUATION MODEL



Attachment A

MODEL OF COMPETENCY-BASED VOCATIONAL PROGRAM



Attachment B

IT WORKS!

April 1987, p. 15.

A Tool for Developing Curricula

by Robert E. Norton

DACUM (Developing A Curriculum) is an approach to occupational analysis that can be used to develop a valid list of competencies for almost any job in two days. At the National Center for Research in Vocational Education, we have found it to be an effective method of quickly determining, at relatively low cost, the tasks that must be performed by persons employed in an occupation, or occupational area. The DACUM analysis can be used as a basis for curriculum development, student guidance, training needs assessments, worker performance evaluations, and performance test development.

DACUM operates on three premises: (1) expert workers are better able to describe/define their job than anyone else, (2) any job can be effectively described in terms of the tasks that successful workers in that occupation perform, and (3) workers need certain, specific attitudes and knowledge in order to perform each task correctly.

How does the process work? A carefully chosen group of about 10-12 experts from the occupational area form a DACUM committee. Committee members are recruited directly from business, industry, or the professions. The committee works under the guidance of a trained facilitator for two days to develop a DACUM chart, which is a detailed and graphic portrayal of the tasks involved in the occupation being studied.

Guided by the facilitator, the DACUM committee identifies general areas of job responsibility, pinpoints specific tasks performed in connection with each duty, reviews and refines the task and duty statements, sequences them, and identifies entry-level tasks. Modified and structured small-group brainstorming techniques are used to obtain the collective expertise and consensus of the committee. High-quality task and duty statements usually result from this interaction. The DACUM analysis also results in lists of tools, equipment, supplies, and materials pertinent to the occupation; traits and attitudes important to workers in that occupation; and general knowledge and skill areas that are prerequisites to job performance.

Because of their current occupational expertise, committee participants do not need to make any advance preparations. Participants on past DACUM committee have, without exception, found the activity to be professionally stimulating.

Once the DACUM chart is developed, we recommend one more procedure—task verification (or "validation," as some prefer to call it). Verification is the process of having experts review and confirm or refute the importance of the task statements. Reviewers are usually selected from the ranks of practicing workers or immediate supervisors of such workers. Commonly a "task inventory" questionnaire is prepared and used to collect the desired information. We feel there are several strong arguments for verification: it provides further evidence that you have the right tasks, it permits greater involvement of business and industry representatives, and it elicits greater public confidence in the relevance of the programs involved.

The DACUM process is particularly useful when a new secondary or postsecondary occupational program is to be offered. When conducted at the user's institution, the process results in two benefits: the institution obtains a solid, locally relevant job analysis as a basis for curriculum development, and receives immediate, strong support for the new program from the business and industrial community. This support results from the substantive involvement of industry people, who tell their supervisors about the relevant programs that institution X is implementing. Often several, if not all, DACUM panel members later serve on an advisory committee for the new program. Institutions that have used the DACUM process often receive donations of equipment and supplies from local employers. Some facilitators even report active recruitment of students for the new program by the panel members.

At this point, you may be wondering how a DACUM analysis differs from other types and sources of job analysis information. An analysis done somewhere else may or may not be relevant to your community. Hence, some type of local verification process should be considered essential. It may cost less to "import" an analysis from another source, but the school is not likely to receive the same value that it derives from a local DACUM analysis.

About the Author
Robert E. Norton is a senior research and development specialist at the National Center for Research in Vocational Education in Columbus, Ohio.

An article from
Vocational Education Journal,
Published by the American
Vocational Assocation.

ATTACHMENT D

SOME TASK RATING OPTIONS

1. IMPORTANCE OF THE TASK -- refers to its criticality to the overall job.

2. TASK LEARNING DIFFICULTY -- refers to how difficult it is to learn to perform the task satisfactorily.

3. FREQUENCY OF TASK PERFORMANCE -- indicates how frequently the task is performed by workers.

4. TIME SPENT PERFORMING THE TASK -- indicates the approximate percentage of work time spent performing the task.

5. CONSEQUENCE OF INADEQUATE PERFORMANCE -- indicates the degree to which inadequate performance affects personnel, equipment, etc.

6. TASK DELAY TOLERANCE -- refers to the amount of delay that can be tolerated without undesirable results.

7. ENTRY LEVEL -- indicates whether performance of this task is expected of beginning workers.

8. PROBABILITY OF DEFICIENT PERFORMANCE -- indicates how likely it is that the task will be performed unsatisfactorily.

9. PERCENT PERFORMING -- indicates the percentage of job holders who actually perform this task.

10. DEGREE OF TRAINING NEEDED -- indicates the amount of training that most workers will need in order to effectively perform the task.

Task # 2.14 - ADDRESS SAFETY ISSUES

In performing this task the Research Scientist/Engineer in Fuels Utilization Technology will need to:

COMPLETE THESE STEPS	KNOW THE FOLLOWING	EXHIBIT THESE ATTITUDES
1. Incorporate safety considerations into equipment design	Relevant design and safety codes	
2. List laboratory activities to be conducted	Scope of project	
3. Determine experience of technical staff in conducting these activities	Assessment procedures	No one is too experienced
4. Identify hazards (electrical, chemical, thermal, mechanical) associated with each activity	The nature of safety hazards How to identify safety hazards	Concern for welfare of workers
5. Analyze experimental protocol for obvious trouble areas	Common safety violations	Non-assuming
6. List all activities that could turn out wrong, causing an accident		Open, and creative mind
7. Formulate a worst-accident situation		
8. Review safety procedures		Cost of safety is never too high
9. Prepare an action plan to respond to a major accident		
10 Educate staff and management on all safety issues		
11. Train staff to recognize potential hazards, and how to react to an accident	Locations of safety equipment; exits; alarms	
12. Conduct periodic safety checks		Be uncompromising
13. Interface with organization safety		

ATTACHMENT F

SECRETARY

TASK ANALYSIS FORM

DUTY: PREPARE WRITTEN DOCUMENTS

TASK: PREPARE A BUSINESS LETTER

STEPS	STANDARDS (HOW WELL)	TOOLS AND MATERIALS	SAFETY	RELATED KNOWLEDGE			ATTITUDES
				SCIENCE	MATHEMATICS	LANGUAGE	
1. Decide on letter format	business letter format used					understand business letter format	
2. Select materials	appropriate letterhead appropriate type style	stationery typeheads	avoid paper cuts			type styles	
3. Check draft for spelling, punctuation, and editing	error free					editing skills, grammar, spelling, and punctuation	caring attitude
4. Edit letter as needed		pencil/pen					
5. Type letter	error free	typewriter or word processor		typewriter or word processor			concern for quality
6. Proofread letter							
7. Make corrections or retype		typewriter or word processor		typewriter or word processor			
8. Make final check	error free neat					proofreading skills	appreciation for accuracy and neatness
9. Submit to writer	within reasonable time						

40

ATTACHMENT G

ANGE COUNTY PUBLIC SCHOOLS
Orlando, Florida 32802

A HANDY REFERENCE GUIDE TO WRITING STUDENT LEARNING GUIDES

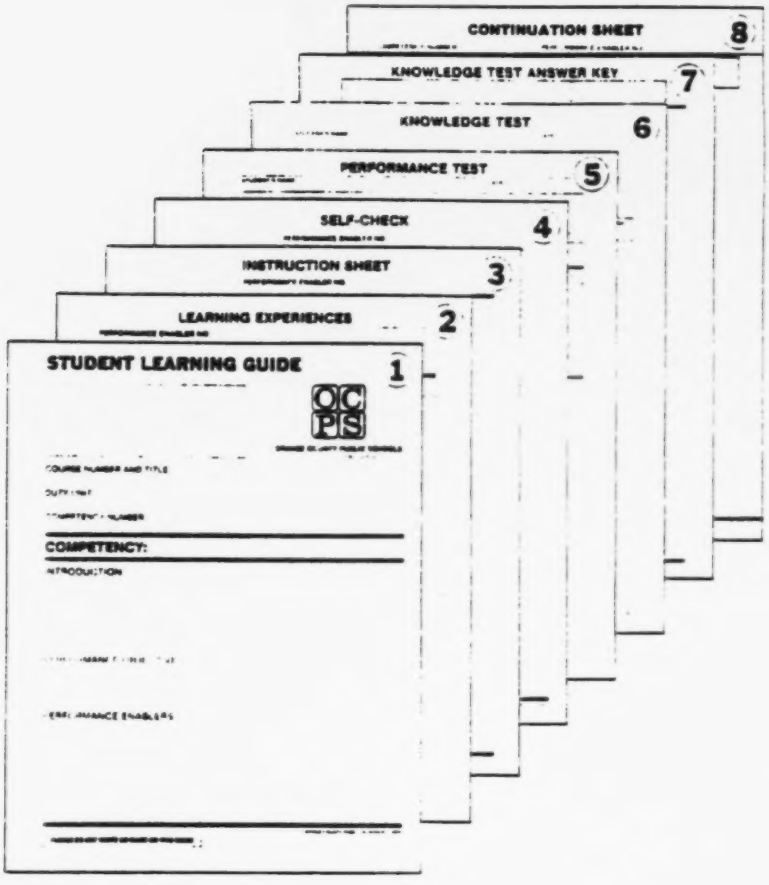
Department of Postsecondary Vocational, Adult, and Community Education
JOSEPH E. STEPHENS, Associate Superintendent

and

Department of Secondary Education
LESTER K. MCKINNEY, Associate Superintendent

STUDENT LEARNING GUIDE FORMATS

Orange County Public Schools



(1) COVER PAGE

- Identifies the school.
- Identifies the district course title/number.
- Identifies the duty/unit of instruction.
- Identifies the competency number and statement.
- Contains the introduction.
- Presents the performance objective and enablers.

(2) LEARNING EXPERIENCES

- Contains the performance enabler.
- Lists learning activities.
- Lists special instructions.

(3) INSTRUCTION SHEET

- Provides a means for instructors to present supplemental information.
- Can contain facts, concepts, diagrams, drawings, illustrations, etc.

(4) SELF-CHECK

- Provides students with frequent and immediate feedback on their progress.
- Includes self-check answer key.

(5) PERFORMANCE TEST

- Evaluates student's ablility to perform the competency.
- Contains the performance standards.
- Contains an evaluation scale.

(6) KNOWLEDGE TEST

- Evaluates student's knowledge of key information.
- Contains the content of a written test.
- Controlled by the instructor, not bound with the learning guide.

(7) KNOWLEDGE TEST ANSWER KEY

- Maintained by the instructor in a secure location.

(8) CONTINUATION SHEET

- Serves as all-purpose continuation sheet for the Cover, Self-Check, Performance Test, and Knowledge Test.
- Can be used for case problems and other special needs.

STUDENT LEARNING GUIDE

★Enter the name and address of your school and any other necessary identification (department, logo, symbol, motto, etc.) For industry service programs, also enter the name of the company that will use the guide.

OCPS

ORANGE COUNTY PUBLIC SCHOOLS
Orlando, Florida 32802

COURSE NUMBER AND TITLE: ★Enter the district course title here.

DUTY/UNIT: ★Enter the duty/unit from your Instructor's Guide, Vol. II.

COMPETENCY NUMBER: ★Enter this number from your Instructor's Guide, Vol. II.

COMPETENCY:

★Enter the competency statement from your Instructor's Guide, Vol. II.

INTRODUCTION:

★Give a brief overview of the learning guide.

★Tell the student what he/she is going to learn, why it is important, how it relates to what has already been learned.

★Specify prerequisites by listing the appropriate competency statements.

★Use no more than 100 words.

★Write the Introduction last to ensure it accurately reflects the contents of the guide.

PERFORMANCE OBJECTIVE:

★Enter the objective as it appears in your Instructor's Guide, Vol. II, or as you have refined it to increase instructional effectiveness.

PERFORMANCE ENABLERS:

★Enter the enablers as they appear in your Instructor Guide, Vol. II, or as you have refined them to increase instructional effectiveness.

★Number these exactly as they appear in your Instructor's Guide, Vol. II.

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PLEASE DO NOT WRITE OR MARK ON THIS GUIDE

★Enter publication date here.

LEARNING EXPERIENCES

PERFORMANCE ENABLER NO. _____ ★Enter this number from the cover sheet.

★Enter the enabler here exactly as it appears on the cover sheet.

★Prepare a separate learning experience sheet for each enabler.

LEARNING ACTIVITIES	SPECIAL INSTRUCTIONS
PLEASE DO NOT WRITE OR MARK ON THIS GUIDE	
★In this column list the activities and assignments you want the student to do in order to achieve this enabler. ★Do not number these activities. ★Begin each activity statement with an action verb; read, view, solve, check, listen to, plan, practice, etc. ★Activities may be in a variety of forms: readings, viewing media, practice exercises, projects, role playing, observation, etc. ★Write directly to the student. Use language he/she is likely to understand. ★Use title and page number in referring students to learning activities. ★If activities are continued on the reverse side or on a continuation sheet, note that on the bottom of this page. ★After reading the learning activities and self-checks in the guide, the student, with the instructor's permission, may take the knowledge/performance tests. If the necessary test(s) is passed, the student may receive credit for having achieved the competency.	★In this column give the student any special instructions that will help him/her complete the activity. ★Write the special instructions directly across from the activity to which it refers. ★Not every activity will require special instructions. ★Use this column to describe: ◊special safety precautions ◊location of materials ◊further explanation of activity ◊how to obtain special resources needed ◊alternatives to the activity ◊pitfalls to avoid

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PLEASE DO NOT WRITE OR MARK ON THIS GUIDE

★This sheet is optional, depending upon whether additional information is needed by the student and not available from other sources.

★Assign a title to the instruction sheet so students and instructor can refer to it by name.

★An instruction sheet may consist of a single sheet or several pages.

★If you use material that has been developed by someone else, give credit to the originator (person, school, etc.)

★Do not use material covered by copyright.

★The instruction sheet is not to be considered consumable, so do not use it as a worksheet. Reproduce student copies from the guide if necessary.

★You may use instruction sheets for:

- ◊special vocabulary lists
- ◊diagrams
- ◊project plans
- ◊observation guides or checklists
- ◊charts
- ◊rewritten material from other sources
- ◊tables and specifications
- ◊new information of your own writing
- ◊special instructions and case problems

★Make the directions or information on the instruction sheet clear to the student so he/she does not need to go to the instructor for an explanation or directions.

SELF-CHECK

PERFORMANCE ENABLER NO. ★Enter enabler number to which this self-check refers.

DIRECTIONS

★Write clear and simple directions for the self-check to the student. If you want the student to compare his/her responses with the answers on the reverse side, or if you want him/her to have the instructor check the work, say so here.

PLEASE DO NOT WRITE OR MARK ON THIS GUIDE

★Generally, each enabler will have a self-check. Sometimes the resource materials used in learning activities contain exercises or evaluation components that can serve as a self-check.

★Each self-check should have an answer key on the back, except when it is a "practice checklist" to evaluate skill development.

★Assign a brief title to the self-check so students and instructors can refer to it by name.

★Limit the self-check to ten or twelve items covering the major points included in the enabler. If possible, confine the self-check to one side of a page.

★You may use any form of test item (essay, short answer, completion, matching, multiple-choice, true-false, etc.).

★If the self-check is in the form of a performance checklist, include a Yes and No column.

3-430-1 © ORANGE COUNTY PUBLIC SCHOOLS 1983

PERFORMANCE TEST

STUDENT'S NAME	DATE

COMPETENCY NUMBER AND STATEMENT	TEST ATTEMPT
★Enter competency number and statement from cover page.	1ST 2ND 3RD

DIRECTIONS

★Give the student very clear and complete directions for taking the performance test.

★Tell the student:
- ◊what he/she is expected to do,
- ◊what conditions must be arranged,
- ◊where to find needed materials,
- ◊what restrictions may apply (e.g., "Do not use any reference materials.")

OVERALL EVALUATION

LEVEL ACHIEVED	PERFORMANCE LEVELS
	4 CAN PERFORM THIS SKILL WITHOUT SUPERVISION AND WITH INITIATIVE AND ADAPTABILITY TO PROBLEM SITUATIONS.
	3 CAN PERFORM THIS SKILL SATISFACTORILY WITHOUT ASSISTANCE OR SUPERVISION.
	2 CAN PERFORM THIS SKILL SATISFACTORILY BUT REQUIRES SOME ASSISTANCE AND/OR SUPERVISION.
	1 CAN PERFORM PARTS OF THIS SKILL SATISFACTORILY, BUT REQUIRES CONSIDERABLE ASSISTANCE AND/OR SUPERVISION.
	0 CANNOT PERFORM THIS SKILL.

INSTRUCTOR WILL INITIAL LEVEL ACHIEVED

PERFORMANCE STANDARDS FOR ACCEPTABLE ACHIEVEMENT. ALL ITEMS SHOULD RECEIVE A "YES" OR "NOT APPLICABLE" RESPONSE	YES	NO	NOT APPL.
PLEASE DO NOT WRITE OR MARK ON THIS GUIDE			
★The performance test should assess only the competency covered by the learning guide.			
★State the items in the declarative, not question form.			
★Use the past tense for all items.			
★Include only items that the instructor can actually observe.			
★State each item so the item includes a judgment of quality, not just whether or not an action was done.			
★You may measure the student's achievement of the competency by evaluating the product he/she produces, or the process the student uses. Usually, the performance test evaluates both product and process.			
★Have an expert colleague in the occupational area review the performance standards items to be sure they are consistent with accepted practice in the occupation.			

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KNOWLEDGE TEST

STUDENT'S NAME	DATE

COMPETENCY NUMBER AND STATEMENT

★Enter the number and statement from the cover sheet.

TEST ATTEMPT

1ST 2ND 3RD

DIRECTIONS

★Give the student clear and complete directions for taking the test. Include: (1) how to respond to the items, and (2) the minimum score required for passing.

STUDENT'S SCORE

☐ PASSED ☐ FAILED

INSTRUCTOR'S SIGNATURE

PLEASE DO NOT WRITE OR MARK ON THIS TEST

★For knowledge competencies, you must include a knowledge test.

★For skill competencies, a knowledge test is optional. A knowledge test may be appropriate if:

- ◊the skill depends on a considerable body of background knowledge,
- ◊the skill includes special safety procedures the student must know before practicing the skill, or
- ◊the knowledge is something the student must know for a licensure examination.

★Knowledge test items should be consistent with self-check items in content.

★To the extent possible, require 100 percent accuracy.

★Multiple-choice items are preferred, since this is the type that students are most likely to encounter in other testing situations.

★Do not limit the knowledge test to low-order (memory) questions. Include high-order questions: comprehension questions, creative questions, and evaluation questions.

★Knowledge tests <u>are not</u> bound with the learning guide. They must be kept in a secure place.

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CONTINUATION SHEET

★Enter enabler number when appropriate.

COMPETENCY NUMBER: ★Enter number **PERFORMANCE ENABLER NO.**

PURPOSE

★Enter a short statement describing the purpose of this continuation sheet.

_____ COVER _____ PERFORMANCE TEST
_____ SELF-CHECK _____ KNOWLEDGE TEST
★Place a check in one OTHER

PLEASE DO NOT WRITE OR MARK ON THIS GUIDE

★This "all purpose" continuation sheet can be used if additional space is needed for any of the pages indicated in the right hand box above.

★Use a separate continuation sheet for each purpose.

★A continuation sheet is not to be used for the cover sheet or self-check except in unusual circumstances.

★A continuation sheet can be used when the performance test includes special instructions, a case study, etc.

★Knowledge tests are likely to require the use of a continuation sheet because test items often need a considerable amount of space.

★SPECIAL NOTES

1. Refer to Volume III, Instructor's Guide, How to Write Student Learning Guides: A Handbook, for detailed learning guide writing procedures.

2. Refer to Volume IV, Instructor's Guide, How to Write Criterion-Referenced Tests: A Handbook, for detailed test writing procedures.

3. Establish the reading level to meet the requirements of your students. Use some form of evaluation index to determine the readability level of your guides.

4. The guide should not be a consumable item except when precluded by shop conditions. Pages may be reproduced for students to use as work-sheets, e.g., word search, forms, exercises, etc.). If necessary, reproduce the performance test so that the student's competency achievement record can be maintained. A separate answer sheet should be used for knowledge tests.

5. Your school will help you arrange for reproduction of the guides. In most cases, a full set of guides for each class will not be required. Perhaps, no more than 5-10 copies will be required.

6. Maintain a master file of your guides to simplify making changes to improve their quality.

7. Number each page as indicated in this reference guide.

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ATTACHMENT H

COMPETENCY-BASED EDUCATION PROGRAM EVALUATION CHECKLIST

Program _____

Name _____

Date _____

Directions: Indicate the extent to which the program being evaluated has implemented each of the following essential elements and desirable characteristics by checking the appropriate box under Level of Implementation.

	Level of Implementation			
	Poor	Fair	Good	Excellent
A. ESSENTIAL CHARACTERISTICS:				
1. Competencies to be achieved by the students have been:				
a. carefully identified	☐	☐	☐	☐
b. verified by local experts	☐	☐	☐	☐
c. made public	☐	☐	☐	☐
2. Criteria for assessing each of the verified competencies have been:				
a. derived from analysis of the competencies	☐	☐	☐	☐
b. explicitly stated along with conditions	☐	☐	☐	☐
c. made public	☐	☐	☐	☐
3. Instructional program provides for the:				
a. individual development of each competency	☐	☐	☐	☐
b. individual assessment of each competency	☐	☐	☐	☐
4. Assessment of the students' competency:				
a. takes knowledge into account	☐	☐	☐	☐
b. takes attitudes into account	☐	☐	☐	☐
c. requires actual performance of the competency as the major source of evidence	☐	☐	☐	☐
5. Students progress through the program:				
a. at their own rate	☐	☐	☐	☐
b. by demonstrating their competence	☐	☐	☐	☐
B. DESIRABLE CHARACTERISTICS				
6. Instruction is individualized to the maximum extent possible	☐	☐	☐	☐
7. Learning experiences are guided by frequent feedback	☐	☐	☐	☐
8. Emphasis is upon students' achievement of exit requirements	☐	☐	☐	☐
9. Instruction is individually paced rather than time-based	☐	☐	☐	☐
10. Instruction is field-centered using realistic work situations and actual on-the-job experiences	☐	☐	☐	☐
11. Instructional materials are:				
a. modularized	☐	☐	☐	☐
b. mediated	☐	☐	☐	☐
c. flexible with both required and optional learning activities provided	☐	☐	☐	☐
12. The instructional program as a whole is carefully planned and systematic—evaluation data is used for program improvement	☐	☐	☐	☐

Level of Implementation: In a fully implemented CBE program, all items will receive an excellent response. If any item receives a Poor or Fair response, you should meet with your competency-based education program coordinator to determine what changes are needed and how you can get help in making them.

Robert E. Norton, Senior Research and Development Specialist
The National Center for Research in Vocational Education, The Ohio State University, Columbus, Ohio.